AMENDMENTS TO THE CLAIMS

1. (Currently Amended) An optical element, comprising:

a single-polarized ferroelectric substrate;

a plurality of domain inversion regions formed in the ferroelectric substrate, the domain inversion regions extending in a thickness direction of the substrate; and

~~a groove~~ grooves formed on ~~the~~ a surface of the ferroelectric substrate between the domain inversion regions, respectively, such that a portion of each of the domain inversion regions protrudes from the surface of the substrate in the thickness direction,

wherein ~~the~~ a depth T' of at least one of the domain inversion regions satisfies ~~the~~ a relation T'<T with respect to ~~the~~ a substrate thickness T.

2. (Currently Amended) The optical element according to claim 1, wherein the at least one of the domain inversion ~~region~~ regions that satisfies the relation T'<T accounts for at least 50% of all of the plurality of domain inversion regions.

3. (Currently Amended) The optical element according to claim 1, wherein the at least one of the domain inversion ~~region~~ regions that satisfies the relation T'<T accounts for at least 90% of all of the plurality of domain inversion regions.

4. (Currently Amended) The optical element according to claim 1, wherein ~~the~~ a spacing of the domain inversion regions is 5 μm or less.

5. (Currently Amended) The optical element according to claim 1, wherein ~~the~~ a width of the domain inversion regions is 5 μm or less.

6. (Original) The optical element according to claim 1, wherein the thickness of the ferroelectric substrate is at least 0.5 mm.

7. (Currently Amended) The optical element according to claim 1, wherein the ferroelectric substrate is a single-polarized crystal, the at least one of the domain inversion ~~region~~ regions has a distal end component in ~~the~~ an interior of the surface of the ferroelectric substrate, and ~~the~~ a direction of the distal end component is ~~the~~ a Y axis direction of the crystal.

8. (Currently Amended) The optical element according to claim 1, wherein each of the ~~groove~~ grooves is formed at a depth of at least 0.5 μm from the surface of the ferroelectric substrate.

9. (Currently Amended) The optical element according to claim 7, wherein each of the ~~groove~~ grooves is formed at a depth of 10 μm or less from the surface of the ferroelectric substrate.

10. (Previously Presented) The optical element according to claim 1, wherein the domain inversion regions have periodic domain inversion structures.

11. (Currently Amended) The optical element according to claim 10, wherein ~~the~~ an angle formed by ~~the~~ a normal line of the ferroelectric substrate and ~~the~~ a direction of spontaneous polarization of the ferroelectric substrate is no more than 30°, and ~~the~~ a Y axis of the crystal is at a right angle to ~~the~~ a period direction of the domain inversion regions.

12. (Currently Amended) The optical element according to claim 10, wherein ~~the~~ an angle formed by ~~the~~ a normal line of the ferroelectric substrate and ~~the~~ a direction of spontaneous polarization of the ferroelectric substrate is no more than 30°, the thickness T of the ferroelectric substrate is greater than or equal to 0.5 mm, and ~~the~~ a period Λ of the domain inversion regions is less than or equal to 2 μm.

13. (Previously Presented) The optical element according to claim 1, wherein the ferroelectric substrate is magnesium-doped $LiTa_{(1-x)}Nb_xO_3$ ($0 \leq x \leq 1$).

14. (Currently Amended) A method for forming domain inversion regions in ~~the~~ an interior of a single-polarized ferroelectric crystal substrate, comprising ~~the steps of~~:

~~providing a groove to the~~ forming grooves on a surface of the ferroelectric substrate ~~and dividing~~ so as to divide the surface of the ferroelectric substrate into a plurality of regions between the grooves, respectively; and

applying an electric field to the plurality of regions ~~and forming~~ to form domain inversion regions, wherein ~~the~~ a direction of the electric field is a direction facing ~~the~~ a direction of spontaneous polarization of the ferroelectric substrate, ~~and in the step of applying the electric field,~~ and wherein said applying of the electric field to the plurality of regions produces a potential difference ~~is produced~~ in the plurality of regions.

15. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ a depth T' of at least one of the domain inversion regions satisfies ~~the~~ a relation $T'<T$ with respect to ~~the~~ a substrate thickness T.

16. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein the plurality of regions are formed so as to be periodically adjacent, ~~and in the step of applying the electric field,~~ and wherein said applying of the electric field produces mutually different potentials ~~are produced~~ in ~~the~~ regions adjacent at a specific period.

17. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~in the step of applying the electric field,~~ said applying of the electric field to the plurality of regions comprises applying a different electric field ~~is applied~~ to each of the ~~plurality of~~ regions.

18. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~in the step of applying the electric field,~~ said applying of the electric field to the plurality of regions comprises applying an electric field that changes with time ~~is applied~~ to any of the plurality of regions.

19. (Currently Amended) The method for forming domain inversion regions according to claim 18, wherein ~~in the step of applying the electric field,~~ the change in the electric field with time is at least 1 kV/second.

20. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ a width of each of the ~~groove~~ grooves is 5 μm or less.

21. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ a width of each of the ~~plurality of~~ regions is 5 μm or less.

22. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ a thickness of the ferroelectric substrate is at least 0.5 mm.

23. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~in the step of applying the electric field,~~ said applying of the electric field comprises alternately applying a positive field and a negative field ~~are applied alternately~~.

24. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~in the step of applying the electric field, the electric field is~~ said applying of the electric field comprises applying a pulsed electric field having a pulse width of 10 msec or less.

25. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein each of the ~~groove~~ grooves is formed at a depth of at least 0.5 μm from the

surface of the ferroelectric substrate.

26. (Currently Amended) The method for forming domain inversion regions according to claim 25, wherein each of the ~~groove~~ grooves is formed at a depth of 10 μm or less from the surface of the ferroelectric substrate.

27. (Original) The method for forming domain inversion regions according to claim 14, wherein the plurality of regions are formed so as to be disposed alternately at a specific period, and the domain inversion regions are formed at the specific period.

28. (Original) The method for forming domain inversion regions according to claim 14, wherein the plurality of regions each have a sub-region group composed of a plurality of sub-regions disposed at predetermined intervals, the plurality of regions are formed so that the sub-region groups are disposed alternately, and the domain inversion regions are formed at the predetermined intervals.

29. (Original) The method for forming domain inversion regions according to claim 14, wherein the ferroelectric substrate is magnesium-doped $LiTa_{(1-x)}Nb_xO_3$ ($0 \leq x \leq 1$).

30. (Original) The method for forming domain inversion regions according to claim 14, wherein the ferroelectric substrate is a substrate composed of X-cut, Y-cut, or Z-cut.

31. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ an angle formed by ~~the~~ a normal line of the ferroelectric substrate and the direction of spontaneous polarization of the ferroelectric substrate is no more than 30°, the domain inversion regions are formed periodically, and ~~the~~ a Y axis of the ferroelectric substrate is at a right angle to ~~the~~ a period direction of the domain inversion regions.

32. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the~~ a thickness T of the ferroelectric substrate is greater than or equal to 0.5 mm, and ~~the~~ a period Λ of the domain inversion ~~region~~ regions is less than or equal to 2 μm.

33. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~in the step of applying the electric field,~~ said applying of the electric field comprises applying an electric charge of at least 100 times a value of 2PsA, where Ps is the spontaneous polarization of the substrate and A is ~~the~~ a domain inversion surface area~~, is applied~~.

34. (Currently Amended) The method for forming domain inversion regions according to claim 14, wherein ~~the step of~~ said applying of the electric field is performed in an insulating solution of at least 80° C.